

# CHEM-BIO DEFENSE

Quarterly

Vol. 4 No. 2



**Product Manager Force Protection Systems (PM-FPS): Equipment that Protects and Secures**

**Warfighters Say Joint CBRN Dismountable Reconnaissance System Limited Objective Experiment Closes the Gap in Dismounted Reconnaissance**

**An Overview of Chemical/Biological Decontamination**





Cover: A firefighter with the 305th Civil Engineering Squadron, McGuire Air Force Base, NJ, decontaminates a HAZMAT technician after he exits a "hot" zone during a Major Accident Response Exercise (MARE). The MARE tests the base first responders' reaction to a simulated hazardous material release. USAF photo by Kenn Mann.



Joint CBRN Dismountable System Limited Objective Experiment. Photo by Courtney Maisch, Camber Corporation.



Members of the 6th Civil Support Team (WMD) go through a decontamination clean-up station after inspecting a vessel for hazardous materials during an exercise in U.S. Coast Guard Station Galveston, TX, Jan. 25, 2007. The 6th CST is using Coast Guard expertise to help them train for boarding and inspecting vessels at sea. (U.S. Coast Guard photo by Petty Officer 3rd Class Adam Eggers) (Released).



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## Guest Columnist: Mr. William D. Hartzell



**Mr. William D. Hartzell**  
**Joint Project Manager,**  
**Decontamination**

A century ago, Chemical/Biological Defense (CBD) equipment consisted of early gas masks and basic skin coverings; simple, somewhat effective guards against death and incapacitation. Gas was widely used during the first World War, many times with weather conditions dictating whether friends, foes or civilians received the brunt of the attack. Following World War I, world governments revolted against the scenes of massive death and destruction by making treaties and invoking promises to end proliferation of chemical and biological weapons. All the while, though, countries continued to stockpile lethal agents and isolated use of these weapons continued to startle sensibilities throughout the world.

Today's fielded chemical and biological defense equipment has advanced to levels that prevent much of the death and destruction these weapons were designed to inflict but significant improvements are still required. We are pushing the technological limits on detection and identification equipment and our individual protective equipment is still the best in the world. However, remaining encapsulated in protective equipment for extended periods of time under already tense situations produce significant physiological and psychological stress. As we address the ever-changing threat and potential scenarios we may face, we realize there is still a lot that needs to be done. Although

advances assure earlier notification, greater protection levels and better treatments, the best option remains to actively avoid contamination and the related effects whenever tactically and strategically possible. When avoidance doesn't work, decontamination becomes extremely important to negate the hazard and return people and equipment to the fight as quickly and safely as possible. Our job at JPM Decontamination is to give our customers the wherewithal to remain effective and when necessary, reconstitute as quickly as possible.

For the most part, the most effective means to decontaminate vehicles, equipment and personnel has been to use hot soapy water, a method that remains a simple, low-tech decontamination procedure still in use that doesn't require a lot of training. Hot soapy water, though, has its share of problems. While it removes most of the agent, some agent will remain on the decontaminated item and water cannot be used on sensitive equipment (such as a laptop computer or aircraft interiors). Any amount of contamination, large or small, reduces the Warfighter's ability to perform the critical missions necessary to prosecute the mission at hand. Sensitive equipment, a recent phenomenon that didn't even exist a century ago, has attained such importance that rendering it useless with water-based decontaminants threatens the mission, the warrior and the fight. You can read about some of today's choices in this issue of Chem-Bio Defense Magazine.

Ongoing efforts undertaken by our team will neutralize airplane, vehicle and ship outer surfaces with new foam decontaminants, inner surfaces and sensitive equipment with a non-aqueous, vaporized decontaminant and assist with mortuary affairs should contaminated remains have to be repatriated. The logistics burden remains one of our biggest challenges and much of the effort underway is to reduce that burden and cumbersome, labor-intensive practices of the past.

Skin decontamination is evolving rapidly as the Program Manager completes advanced analysis of new compounds that remove and eliminate agents without negative skin or health reactions. We begin fielding a new skin decontaminating lotion this year. Our science and technology efforts are focused on decontaminants that fill the gap between existing capabilities and those ultimately needed by the Warfighter for emerging threats. The baselines we are fielding today will become the new standard to build upon through scaleable, aggressive technical base and science and technology solutions. We will field solutions as they become mature and build upon them via spiral developments. Even further, for the next generation of decontamination, we are pursuing active and strippable coatings that will have the capability to decontaminate an agent as it attaches to surfaces; paints or other coatings that can be removed and easily contained when contaminated. The main objective is to develop, demonstrate and field innovative coatings and surface modifications that exhibit efficient biocidal activity against bacteria, bacterial spores, and are self-cleaning.

Our challenges include many of those experienced by other project and program management offices with some unique regulatory requirements such as timely Food and Drug Administration and Environmental Protection Agency approval processes. We also experience delivery delays caused by events inside and outside the control of our program managers, test planning that requires intensive coordination and management, endless and evolving threats that potentially inject an element of obsolescence into every product delivered. Through all this, we are excited to be contributing to our country and its finest. I know that capabilities being delivered by JPEO-CBD are the best, most synergistic chemical and biological defense products ever and provide Warfighters with essential protection that far exceeds the capabilities in the hands of our young warriors even a few years ago. The Joint Project Management Office for Decontamination is dynamic and we are blessed to have a great mix of talented professionals. Our goal is to provide the very best we can to our country and those charged with the awesome responsibility of defending it. Whether they are Soldiers, Sailors, Airman, Marines, the men and women of the Coast Guard or First Responders here at home, our mission is to be totally focused on ensuring they have the absolute best equipment we can give them. I am honored to be associated with JPM Decontamination and am very proud of our team. I hope you enjoy this edition of our publication and we welcome your comments and ideas.

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# RENOVATED HIGH-CONTAINMENT LAB offers more effective research space

By Karen Fleming-Michael, US Army Medical Research and Materiel Command

**V**ery few people ever get a chance to see the inside of the high-containment suites at the U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID).

However, members of local media outlets as well as a few Fort Detrick, MD, commanders got a chance January 22 to step into a newly renovated biosafety-level four suite - the highest level of containment - before it is put into use in the coming weeks.

"Most of the time you have to look through windows to see the suite," said Caree Vander Linden, the Public Affairs Officer for the institute. "This is a rare opportunity to see it before we button it up and it goes hot."

When it goes hot, no one will enter the air-locked suite without changing into colored surgical scrubs and zipping into electric blue "spacesuits" in a prep area just outside the level-four area. Intricate precautions are taken because the agents that are worked on in the suites, like Ebola, Marburg and Lassa fever viruses, have no cure or treatments, said Dr. Tom Geisbert, chief of the Department of Viral Pathology and Ultrastructure within the Virology Division.

"We don't know enough about them," he said. "These are emerging infections so you want to be at the highest level of protection you can get, and the pressure suits are the best you can get."

Animal assessment-4, called AA-4, is one of two main BSL-4 suites at the institute. Renovations took seven months, \$3 million and have resulted in upgraded equipment and more efficient use of space. For example, before the renovation, researchers had nowhere to store expensive equipment.

"We had to cover it and put it in the large animal area. You can imagine, here's this sensitive equipment that you have and the last place you want it is an animal room," said Lisa Hensley, a microbiologist who has worked at the institute for eight years in high-containment laboratories.

Inside the freshly painted suite, the number

of rooms for culturing cells has doubled from one to two. Having only one limited the number of people who could work on experiments. And the number of double-decked incubators has quadrupled, going from two to eight.

"When I'm conducting experiments, I can easily fill one of these by myself in one week," said Joan Geisbert, a biological laboratory science technician whose specialty is working in and training others to work in BSL-4 conditions. "So when you run out of incubator space, you're out of business. You can't do anything else."

Having the capacity to conduct more cell culture experiments also cuts down on the number of animal tests, Hensley said.

Safety is at the heart of many of the renovations. Emergency flashlights automatically

activate when there's a power failure so researchers, dressed in their pressurized containment suits, can find their way to the steel exit doors that lead to a chemical shower. The air that continuously flows through the suits, coupled with the hearing protection the researchers wear, make hearing in the suite a challenge.

Flashing lights alert the researchers if a problem occurs with their air supply, if there's a message from security or if there's a phone call.

"It's noisy in the suit," Hensley said, adding that in her time at the institute, the amber light indicating she had five minutes of air remaining turned on just once, when lightning struck the building.

The suite also doubled the space for animal cages, going from two to four rooms, some of which are equipped to monitor the animals continuously by telemetry. An automatic watering system, hands-free sinks and cameras to monitor the animals are all available in the animal rooms.

"Our veterinary staff ensures the animals are well cared for," Hensley said.

Other improvements include new air handling equipment, new biosafety cabinets and new or refurbished autoclaves for sterilizing equipment.

The renovations, according to a background paper, ensure that the U.S. Army Medical Research Institute of Infectious Diseases remains a state-of-the-art facility and can continue its reliable and safe operations.

Before the suite can go from cold to hot, it will have undergone several inspections, said Dr. Cathy Wilhelmsen, the institute's biosafety officer. Representatives have visited from the Centers for Disease Control and Prevention's Select Agent Program, the U.S. Department of Agriculture, the Army Safety Office, and the Association for Assessment and Accreditation of Laboratory Animal Care International.



**Dr. Tom Geisbert demonstrates how the air lines attach to high containment suits during a Jan. 22 tour of a biosafety level 4 lab at the U.S. Army Medical Research Institute of Infectious Disease.**

Photo by Karen Fleming Michael

# Enhancing Warfighter Protection

*By Rosemary Salem, Navy Clothing and Textile Research Facility, Natick*

## Through Advanced Clot

User-friendly modifications to the design of the sleeves and leg bottoms of carbon-based chemical/biological (CB) protective ensembles will soon provide enhanced chemical vapor and aerosol protection for today's Warfighter.

Initially funded by the 6.2 Chemical/Biological Tech Base Community, scientists at the Natick Soldier Systems Center and the Navy Clothing & Textile Research Facility explored innovative solutions to the interface challenges of CB protective ensembles, such as the interfaces at the sleeve/glove, leg/boot, hood/mask, and jacket/trousers. Additionally, new concepts regarding front closures utilizing slide fasteners were investigated.

These efforts focused on the insertion of an inner cuff for sleeves and leg extremities. An "inner skirt" was also added to address the junction of the coat and trouser. Earlier developmental efforts utilized a secondary impermeable barrier, but this new work theorized that the use of a lightweight, carbon impregnated, elasticized material would offer greater benefit. The use of secondary, breathable, carbon-based, adsorbant material at the interfaces worked similarly to the primary material comprising the majority of the ensemble. This breathable material would allow air exchange common to all clothing systems, but the presence of carbon at the interface would serve to reduce vapor and aerosol penetration. Previous efforts blocked air exchange at the interface, but diverted the natural air flow to other openings – commonly referred to as the path of least resistance.

Furthermore, allowing air exchange helps to minimize heat stress in comparison to earlier impermeable material approaches. In addition to secondary adsorption provided by the inner sleeves and inner legs, a convoluted path of entry for vapor and aerosol was created whereby entry into the suit must follow a circuitous path created by the layering of the outer sleeve, gloves and inner sleeves (or outer legs, boots and inner legs).

Experimental Chemical Protective Garments were prototyped at Natick and evaluated in the field and laboratory. The value of the new interface designs were proven during a Limited User Evaluation at the Chemical School at Fort McClellan, AL; during a User Wear Assessment at Fort Lewis, WA; and in Man-in-Simulant Test (MIST) Evaluations at Dugway Proving Grounds, UT.

# hing Technology



**JPACE BOOT 1, 2, and 3**

Suit Technology (JSLIST) Combat Vehicle Crewman coverall (JC3). The developmental JC3 coverall, utilizing selectively permeable membrane technology, incorporates an adjustable neoprene cuff in lieu of the Nomex cuff. The CB inner glove is donned under the inner sleeve and cuff, and the neoprene cuff is securely fastened with a hook and loop fastener tab. The CB outer glove is then donned over the inner sleeve and cuff. The outer sleeve is then pulled down and the sleeve tab of the outer sleeve secured with another hook and loop fastener tab, closing the sleeve opening.



**JC3 GLV 1, 2, and 3**

Leveraging off that success, several inner sleeve and inner leg designs utilizing the convoluted path were prototyped and tested during the Joint Protective Aircrew Ensemble (JPACE) research and development phase. Eventually, a design utilizing an inner sleeve and inner leg made of carbon-impregnated material and a flame resistant Nomex cuff was developed. The new design, when coupled with a new donning sequence for the glove or boot, was successfully incorporated into the Full Rate Production (FRP) of the JPACE Chemical Protective Coverall (CPC).

In the JPACE coverall, the inner sleeve design is comprised of an extension of carbon-impregnated material, which is stitched into the seam of the two-piece sleeve lining. A rib-knit Nomex cuff is stitched to the open end of the inner sleeve. The CB inner glove is donned under the inner sleeve and cuff, while the CB outer glove is donned over the inner sleeve and cuff. The outer sleeve is then pulled down and secured with the sleeve tab, closing the sleeve opening, completing the convoluted path.



**JPACE GLV 1, 2, and 3**

The inner leg design is similar in concept to the inner sleeve design. An extension of carbon-impregnated material is stitched into the seam of the two-piece leg lining, forming the inner leg, and a rib knit Nomex cuff is stitched to the open end of the inner leg. The donning sequence of the inner leg and CB boot is critical to the improved level of protection. The flight boot is secured over the cuff and inner leg, and then the vinyl overboot is donned over the flight boot and secured over the inner leg of the coverall. The outer leg is then pulled down into its final position, and secured with the leg tab, closing the leg opening.

Similar designs using the tortuous, convoluted, circuitous path are being evaluated for the Joint Service Lightweight Integrated

The JC3 coverall leg opening functions a bit differently, as the inner leg and adjustable neoprene cuff are worn on the outside of the boot. The inner leg cuff is securely fastened by a hook and loop fastener tab, and then the vinyl overshoe is donned. The outer leg is pulled down to its final position, and the leg opening vent is zippered closed.



**JC3 BOOT 1, 2, 3, and 4**



# PRODUCT MANAGER FORCE PROTECTION SYSTEMS [PM-FPS] Equipment that Protects and Secures

By Lt. Col. Brian P. Shoop, Product Manager, Force Protection Systems

**A**symmetric threats are evolving from the Global War On Terrorism (GWOT) making physical security/force protection (PS/FP) more important than ever before. Product Manager Force Protection Systems, chartered under the Joint Program Executive Office for Chemical and Biological Defense, performs as the Department of Defense (DoD) Centralized Manager for PS/FP systems for Army and Joint Service use. PM-FPS, in conjunction with its strategic partners, continues to "push hard" to bring critical new PS/FP technologies to the hands of the Warfighter, enhance his capabilities, and protect valuable resources from an adaptive threat.

The following systems, currently available to the Services or nearing production, are bringing the future of PS/FP to the present and PM-FPS is excited to be a part of this dynamic and complex environment. The following two scenarios highlight the importance of these new technologies in the current GWOT environment.

## Scenario #1: Foiled Terrorist Plot

It's 0300 on a Saturday morning sometime in the near future. The terrorist cell has been planning the operation for months and feels confident it will achieve its objective to steal and employ lethal chemical agents from a DoD chemical demilitarization facility. The terrorists

believe they have all the information they need to execute a successful attack. However, the facility has recently been outfitted with the latest in intrusion detection capability. This capability includes the Integrated Commercial Intrusion Detection Systems (ICIDS) and the Mobile

Station and an immediate "Intruder Halt" challenge as a high intensity spotlight is directed at the terrorist team. The operator at the Guard Control Station, eight miles away, receives a warning bell and notices the Operator screen has activated with a video image of movement in the

restricted area. Taking control over from the robot, the operator issues a verbal challenge and switches to the infrared imager as the terrorists attempt to hide. Their body heat gives away their position immediately. The video recorder captures the incident since the first alarm. The operator remotely maneuvers the robot keeping the terrorists in sight to assess the situation. It is an easy task to vector the reaction force to their location for an easy and safe capture. With their prisoners in tow, the reaction force departs the secure location.

The operator returns the robot to autonomous patrol and returns to other duties. The uncomplaining, tireless, and efficient sentry continues the shift. To learn more about these systems, please read on.

## ICIDS: Comprehensive Intrusion Detection for the Future

ICIDS is designed to meet the needs of security and law enforcement agencies at DoD facilities throughout the world. It provides a means for commanders to



**MDARS Patrol Unit Vehicle**

Detection Assessment Response System (MDARS). ICIDS, the latest in standardized Commercial Off-The-Shelf (COTS) intrusion detection system (IDS) technology and MDARS, a cutting edge robotic system-of-systems designed to conduct semi-autonomous roving patrols and intrusion detection activities are designed to work together to provide comprehensive PS/FP for the chemical facility.

As the terrorists attempt to breach the perimeter, they are immediately detected by the ICIDS system. MDARS is automatically deployed to the detection zone and quickly assesses the threat. The robot generates an alarm to the Guard Control



detect, assess, and respond to unauthorized entry or attempted intrusion onto their installation or into their facilities. First fielded in 1992 and now in its third generation, ICIDS is configured for use and application at nuclear and chemical munitions storage sites; conventional arms, ammunition, and explosive AA&E storage sites; arsenals and depots; and in the security of vital sensitive military resources and materiel organic to tenant units and organizations at military installations worldwide.

The ICIDS-III system includes state-of-the-art interior and exterior sensors, primary monitor console, remote area data collectors, close circuit television, and entry control systems.

### **MDARS: Robotics Adds New Dimension to Installation Security**

The military's first autonomous robotic sentry is nearing the production and fielding decision. The goal of a robotic platform performing the surveillance and response at secure sites has been an elusive and complicated development, but the solution is near at hand.

MDARS can be used at a variety of installations – storage depots and arms, ammunition, and explosive storage facilities – to detect personnel who attained unauthorized access to a facility. Theft detection payloads include a product assessment system to verify the status of products through the use of radio frequency identification tags and a barrier assessment system that can check the status of locking mechanisms. MDARS can investigate the source of alarms from remote locations before dispatching guards to the scene.

A single operator can manage a fleet of MDARS vehicles through a three-screen control station which displays the location of each vehicle on an area map, video from the vehicle's camera systems, and audio from the vehicle's on-board microphone.

The MDARS is in the final stages of a multi-year system development and demonstration contract. During an Early User Appraisal held at Hawthorne Army Depot (HWAD), NV, the MDARS was operated by the depot guard force. In addition to successfully passing all required testing, MDARS functioned as a compensatory measure in the HWAD physical secu-

rity plan and also performed duties in a stationary overwatch mode in ammunition loading and unloading areas. A Milestone C Full Rate Production decision was approved in December 2006.

When fielded, MDARS will revolutionize the way installations protect critical assets from emerging GWOT threats.

### **Scenario #2: A Small Unit in Action**

It's after midnight and the platoon leader is exhausted. The platoon has been working around the clock to secure the small town from terrorist attack. His fire teams are spread thin to cover the entire town, but he is confident in the new force protection capability in his arsenal. This capability includes the Lighting Kit, Motion Detector (LKMD) and the Battlefield Anti-Intrusion System (BAIS). LKMD, an "electronic trip flare" that provides programmable responses of illumination/sound and BAIS, a lightweight, sensor-based warning system that provides intrusion detection and warning, are designed to work together to provide comprehensive PS/FP for the small unit. The platoon leader watches the perimeter carefully through his binoculars, scanning the ridgelines and the gullies that lead to the stream at the foot of the trail. The listening post/observation post (LP/OP) on the opposite side could view most of the area blocked to him by the lay of the land, but gullies and the dead space of micro-terrain were a concern.

They had manned the posts for two days and there had been only a little animal activity. The platoon leader suddenly sat up. "There's movement at the bridge!" he announced. The bridge was out of sight from this position. "Post 2, I have a BAIS alarm at the far side of the bridge. Do you have eyes on?"

Post 2 replied, "Not yet, but I am getting a vehicle alert from 21."

"Watch the draw; it looks like we have visitors," the platoon leader warned. Glancing at the small green monitor in his hand, the platoon leader notes the LKMD sensors are beginning to report movement at the draw on the near side of the out-of-sight bridge, well over two clicks away, moving toward them. He radios for an artillery mission to be prepared to execute a call for fire at the designed reference point.

Post 2 reports, "I see six armed victors



**ICIDS-III Primary Monitor Console**



**LKMD Modules**



**BAIS Kit**

moving up the draw." The platoon leader replies, "I have the 6 on the line, and we will get some artillery help here in a moment."

To learn more about these systems, please read on.

### **LKMD: Force Multiplier for the Small Unit**

A small, but essential item – the LKMD, AN/GAR-2 is a lightweight, compact, modular, dual sensor-based early warning system that provides increased operational reaction time for small units, such as individuals, teams, squads or platoons. The LKMD may be used as a tactical stand-alone system or as a supplemental device for use with other PS/FP systems.

In all scenarios and environments,



the LKMD will provide leaders with increased situational awareness and the ability to monitor more terrain with fewer personnel. Using the LKMD as part of an integrated, in-depth, layered security construct will further enhance force protection. The LKMD also has applicability in a Military Operations in Urban Terrain (MOUT) environment. It can be used to monitor access/entry points into buildings, warehouses or secure areas, and as a supplement to fixed PS systems. The ability to integrate the LKMD into existing PS systems provides an additional security capability at a low cost to the user.

A Milestone C Low-Rate Initial Production decision is anticipated for fourth quarter fiscal year 2007. A Full-Rate Production decision is anticipated for third quarter fiscal year 2009.

### **BAIS: Portable Early Warning for the Small Unit**

The BAIS AN/PRS-9 was developed to meet an infantry requirement for small units by replacing the obsolete Platoon Early Warning System, AN-TRS-2 units. Its design is compact and it can be used either as a tactical stand-alone system or as a supplemental device with other security systems. A single BAIS consists of one radio receiving set and three seismic-acoustic detector assemblies that provide coverage across a 450-meter tactical front.

The hand-held monitor serves as the user interface, allowing the operator to program the sensors with an operating channel and assign individual sensor identification to each. The sensors transmit alarms to a receiver that can be more than two kilometers away.

This year marked the fielding of the first production of the BAIS by PM-FPS. The first unit equipped was achieved on February 27, 2006 when a total of 140 BAIS production sets were fielded to the 2nd Stryker Brigade Combat Team of the 25th Infantry Division (Light) in Hawaii. Additional fieldings included the 3rd and 4th Brigades of the 25th Infantry Division in Hawaii and Alaska.

### **Non-Intrusive Inspection (NII) Systems: High Tech Protection Against Vehicle Borne Incendiary Explosive Devices (VBIEDs)**

Non-Intrusive Inspection System (NII) is a family of systems that use both nuclear (gamma) and X-ray technologies to produce a graphic image from which a trained operator can detect explosives, drugs, and other contraband in cargo containers, railroad cars, trucks and vehicles entering DoD facilities/areas of interest.

The Mobile Vehicle and Cargo Inspection System (MVACIS) is a truck-mounted, COTS product that utilizes a nuclear source that can penetrate approximately 6.5 inches of steel. It can be employed in static locations or moved rapidly to establish checkpoints to interdict enemy movement or contraband.



**MVACIS**



**ZBV**

The MVACIS is currently employed at installations in the United States under the Army's Access Control Point program and at forward operating bases in Iraq, Afghanistan, Kuwait and Qatar. The Relocatable Vehicle and Cargo Inspection System (RVACIS) is a rail-mounted, COTS product that utilizes a nuclear source that can penetrate approximately 6.5 inches of steel. It can be employed in static locations or moved to locations with prepared flat surfaces within 24 hours. Use of the rail system eliminates the requirement to maintain a truck platform and the presence of an overhead articulated arm which can be struck and damaged by vehicles being scanned.

The Z-Backscatter Van (ZBV) is a van-mounted, COTS product that utilizes backscatter X-ray technology that can penetrate approximately 1/4 inch of steel. It can be employed in static locations or moved rapidly to establish checkpoints where scanning of cars or larger vehicles or containers with smaller, less complex loads is expected.

In support of an approved Operational Needs Statement for Combined Joint Task Force 76, the Technical Support Working Group funded PM-FPS to research, develop and deliver a second prototype Military Mobile Vehicle and Cargo Inspection System (MMVACIS). The MMVACIS is an up-armored High Mobility Multi-Purpose Wheeled Vehicle (HMMWV)-mounted, COTS product that utilizes a nuclear source which can penetrate approximately 6.5 inches of steel. It can be employed in static locations or moved rapidly to establish checkpoints, even in rough terrain, while providing ballistic and blast protection for its operators. The vehicle will fill a role that existing systems are unable to do – forward deployment and external vehicle checkpoints. The new MMVACIS has the same over terrain mobility characteristics as any other military HMMWV and trailer system. The MMVACIS will be employed in Afghanistan.

### **Access Control Point (ACP)/Automated Installation Entry (AIE)**

Since the September 11, 2001 terrorist attacks, entry onto military installations has become much more controlled. This change significantly increased the costs associated with guarding installations – the Army alone spends more than \$350 million annually on contract security guards. Aside from the costs, installation protection measures were failing to provide a thorough means of identity authentication. The visual inspection of the identification card provides little assurance the card is indeed authentic, which calls into question the reliability of the process.

For these reasons, the Services began implementing automated technologies at the installations. While these initiatives may address certain aspects of automated authentication, they do not provide a holistic approach to an integrated solution. Working with the Office of the Provost



**MMVACIS**

Marshal General, PM-FPS is developing the Automated Installation Entry (AIE) program. The main objectives of the program are to: (1) reduce costs of current guard force requirements for authentication of personnel and vehicular access with the insertion of technology, (2) improve security by verifying personnel credentials against an interactive database to confirm authorization for access to an installation, (3) maximize vehicular throughput rate at the perimeter gates, and (4) standardize Army requirements for policy compliance, operator training and maintenance. PM-FPS is also working with the DoD Joint Requirements Working Group and the Defense Manpower Data Center to develop common requirements and policies for automated installation entry control. A more holistic solution to integrate the various systems from different organizations and Services will provide a number of benefits through collaboration, standardization and economies of scale. While each of the Services have their own peculiarities, many of the requirements are similar because they are mandated by Federal and DoD regulations and policies.

### **Family of Integrated Rapid Response Equip- ment (FIRRE)**

A Soldier's best defense is the equipment he has on hand to evaluate "their" offense!

The intent of FIRRE is to rapidly evaluate and determine force protection requirements and develop tactics, techniques, and procedures while simultaneously reducing manpower requirements, enhancing force protection and reducing casualties for forward deployed forces. The force protection mission includes: persistent surveillance at captured ammunition/unexploded ordnance sites, explosive

**Fort Hood AIE Prototype**

ordnance detection and chemical, biological, nuclear and radiological detection and monitoring.

The FIRRE took part in a demonstration as part of the Army Chief of Staff initiative, known as the Comprehensive Force Protection Initiative (CFPI) held at the Yuma Proving Ground (YPG), Yuma, AZ, from August 28, 2006 - September 27, 2006. The goal of CFPI was to identify those force protection capabilities desired in the near term (next 12 months) and intermediate term (12-36 months). The event provided FIRRE with an opportunity to demonstrate its "ground protect" capabilities against a live Opposing Force (OPFOR). Previous integrating assessments at HWAD led to this capstone demonstration. The FIRRE specifically demonstrated its ability to detect, assess, and act (proactive & reactive) against ground threats at fixed sites (Forward Operating Bases and remote sites) to meet CFPI and Maneuver Support Center, (MANSCEN) mission requirements.

The FIRRE performed very well – consistently detecting (5-6 KMs) and identifying (2-2.5 KMs) enemy insurgents (played by the NTC OPFOR) and supported the defeat of the OPFOR during the only free play exercise (no limits placed on the OPFOR). The user representative gave it high marks and fully supports the "Force Protection System of Systems" approach. Both unmanned ground vehicles (UGVs), the FIRRE UGV (developed by Remotec) and the Special Weapons Observation Reconnaissance Detection System (Foster-Miller), were employed by the battle captain and performed extremely well.

FIRRE Integration Assessment III will be conducted at Hawthorne before the end of the calendar year to assess the system improvements made from the CFPI Demonstration. FIRRE will also be participating in the next CFPI demonstration tentatively scheduled for April 2007.

*See detailed article on the upcoming FPED.*

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**FPED**



# 6TH BI- FORCE PROTECTION EQUIPM SCHEDULED FO

By Lt. Col. Brian P. Shoop, Product Manager, Force Protection Systems, Mr. Jim Suarez, Computer Sciences Corporation (CSC) and Ms. Judith Sauls, Computer Sciences Corporation (CSC)



**Bird's Eye View of Vendors at FPED V, Quantico Marine Base**

Its 8:15 a.m. and as employees arrive for work a fog dissipates outside. In an instant, the stillness is shattered by a thunderous explosion. The air is



**Unmanned Aerial Vehicle**

superheated as a vehicle-borne improvised explosive device explodes in a violent ball of heat and pressure. Vehicles are tossed in the air and are destroyed, but the windows of the nearby office complex only flex and crack with the force of the explosion. Fortunately, there are few injuries and little damage to the buildings avoided by the diligence of the complex's security officer. The security officer acquired

knowledge, equipment and skills at the Force Protection Equipment Demonstrations (FPED).

If you take the possibility of a terrorist attack or an enemy breach of your perimeter seriously, how do you know what type of equipment exists that can protect your personnel and assets? Where can you go to become informed and possibly experience a "hands-on" demonstration of the various security items being produced?

If you haven't heard of FPED, it is time you became acquainted with this tremendously successful and informative event.



**Demonstration of Blast Resistant Barriers**

The FPED provides a venue to showcase state-of-the-art commercial off-the-shelf (COTS) force protection equipment to leaders and decision makers at all levels from the Department of Defense (DoD), federal departments and agencies, state and local law enforcement and corrections agencies. Live demonstrations of equipment give leaders and decision makers an opportunity to observe and become familiar with equipment that has applications across a wide range of force protection categories.

The JPEO-CBD Product Manager, Force Protection Systems (PM-FPS) hosts the FPED for the DoD Physical Security Equipment Action Group (PSEAG).

The first FPED was conducted at Quantico Marine Corps Base, VA, in September 1997. By 2005, it had grown to 550 vendors who displayed over 2,900 products



**Barrier Wall after Explosives Demonstration**

and attracted 11,000 attendees from various DoD, Federal, state, local and foreign governments.

The FPED VI will be conducted at the Stafford Regional Airport from August 14 - 16, 2007 and is expected to host more than 600 new and returning exhibitors. As in the past, FPED is cosponsored by numerous US Government agencies – The Joint Staff's Directorate of Operations for Combating Terrorism, the Department of Energy, the Technical Support Working Group and the National Institute of Justice.

The demonstration is a "must see" for those who have the mission to protect people, buildings and other property. Several thousand products will be on display. The equipment spans the range of technology from concrete barriers and under-vehicle inspection mirrors to mobile vehicle inspection systems capable of detecting contraband in tractor trailers passing thru check-points.

The FPED VI will be open from 10:00 a.m. until 4:30 p.m. daily, and night vision



# ANNUAL EVENT DEMONSTRATION (FPED) R AUGUST 2007

demonstrations will be held from 8:30 p.m. until 10:00 p.m. August 14 and 15, 2007. Special demonstrations include unmanned aerial vehicles in flight, fire demonstrations designed to illustrate the



**Personnel Alerting Systems**

fire retardant capabilities of specialized products, robotic ground vehicles and spike demonstrations highlighting the effectiveness of spike strips in shredding tires. Attendees should plan on attending for at least two days in order to review everything brought to FPED VI.

Equipment demonstrated at FPED VI will be organized into 20 different categories ranging from access control to waterside security equipment. Equipment brought to the venue will be available within 90 days of the demonstration end date and include a variety of different force protection and physical security items like biometrics, night vision and optics devices, vulnerability assessment/analysis software, explosive ordnance disposal equipment and armored and utility vehicles.

Exhibitors will have the opportunity to demonstrate their products in a field environment through the use of operational areas, fence lines and sensor fields. The Quantico blast and ballistics ranges will

showcase equipment products designed to protect against explosives ranging up to 50 pounds of TNT and various calibers of small arms munitions.

A compact disc will be published after the event with a comprehensive list of exhibitors and their products. The FPED is the only event which produces a tool to capture product technical information and images on every item brought to the exhibition.

Details on FPED VI are available at <http://www.fped6.org>. Attendance by both vendors and attendees is free; however, the show is not open to the public and



**Vendors along the Flight line**

non-government civilian attendees must have a government sponsor with a professional affiliation to force protection/home-land security.

The registration process will be available on-line through July 31, 2007. After that date, attendees will either have to fax in their registration or register on-site. Preregistered attendees will be mailed a show badge, attendee instructions, a daily schedule and a parking pass.


If you have never attended an FPED, or even if you have, this is an excellent opportunity to expand your knowledge of the best force protection/physical security



**Shatter Proof Glass Demonstration**



**Mobile Detection Assessment Response System (MDARS) Unmanned Robotic Ground Vehicle**

products available on the market today. So mark your calendar for August 14-16, 2007, we'll see you there! 



# JMDS

## Joint Material Decontamination System

*By Steve Kaminsky, Joint Program Manager, JMDS*

**S**ince the early days of man, cleaning material or equipment could not be accomplished without using water. Decontamination was no exception. For far too long, chemical and biological decontamination required using hundreds of gallons of water or decontaminants, and a lot of manpower to “wash” contaminated equipment or personnel. Though an enormous logistics feat to achieve, it has long been an accepted practice. The acceptance of wash as the primary method of decontamination has been reinforced by the limited advancement in decontamination technology over the last 50 years. With little in ways of technology advancement and lack of new missions, the decontamination commodity had little reason to evolve. Over time, all of this brought about a status quo culture within decontamination that persisted. However, with the U.S. Armed Forces increasing reliance on sensitive electronic equipment, traditional decontamination methods that potentially damage equipment is no longer an option. A new capability is needed to ensure the survival of critical equipment and maintain our warfighters’ advantage on the battlefield.

The Joint Service Sensitive Equipment Decontamination (JSSED) program was an attempt to address the new and emerging challenge of decontaminating sensitive electronic and optic equipment. Early JSSED prototypes did not deviate far from their predecessors that used liquid decontaminants. These prototypes used an electronic-friendly solvent to wash and remove chemical and biological hazards from the equipment. The JSSED solvent technology, while represented an evolution in decontamination capability, was still in the dark ages logistically. To decontaminate using the solvent wash process, the equipment was submersed in gallons of solvent. In an operational environment, with multiple JSSED machines, several hundred gallons of solvent would be necessary to perform a single decontamination mission. This leads to the usual logistics issues of size, weight, and transportation that severely handicap the system.

Meanwhile, the Joint Platform Interior Decontamination (JPID) program team was looking for ways to decontaminate the non-hardened interiors of vehicles, aircraft, and ships. Traditional washing of the interior would likely damage non-removable electronics; flooding large interior spaces with solvent was impractic-



cal since it would require an airtight space and thousand of gallons of solvent. A new and innovative approach was needed to solve the sensitive equipment and platform interiors problem. Both programs, though differing significantly in operational use, have similar efficacy and material compatibility needs. But can one technology meet both programs requirement?

In 2002, a new concept called vaporous decontamination was explored through a congressionally funded Cooperative Research and Development Agreement (CRADA). This new decontamination concept involves converting liquid

tion: reinventing the culture and the way of thinking.

Fortunately, the decontamination community has received two critical elements vital to success, vision and leadership. Under the guidance of Maj. Gen. Stephen Reeves, Joint Program Executive Officer for Chemical and Biological Defense (JPEO-CBD) and Air Force Col. Dale Takenaka, former Joint Project Manager Decontamination (JPMD) (Dec 04 - Jul 06), initiated a plan to transform sensitive equipment and platform interior decontamination. One of the critical first steps was an honest assessment of decontami-

posals (RFP) for System Design and Development in March 2007, four months after Milestone B, with award planned for June 2007. The program's schedule is focused on providing Warfighters with the earliest possible capability; a risk management approach more in line with the acquisition environment of today.

An upcoming JMDS logistics study in May 2007 examines and mitigates the decontaminant logistics trail; another study/demonstration enhances the efficacy of the decontaminant through manipulation of variables such as concentration, temperature, and time; and finally, lever-

## ***“... can one technology meet both program's requirement?”***


decontaminant into a vapor to fill contaminated space and chemically neutralize the hazards. The potential of such technology compared to decontamination practices in the past is astounding. Imagine a vaporous decontaminant filling the interior space as large as a cargo aircraft. Imagine the vaporous decontaminant chemically attacking the harmful chemical and biological hazards, rendering them harmless without leaving any toxic waste or physical force. Imagine all this can be accomplished with a few liters of the decontaminant instead of thousand of liters. Imagine further this process applied to sensitive equipment in a small chamber filled with sensitive electronics and optics. With vaporous decontamination, one technology has the potential to solve two unique operational challenges and eliminate those supply chain issues that undermined decontamination programs in the past. This concept of turning liquid into vapor represents a major advance from the traditional approach to decontamination. This concept is an opportunity for the decontamination program office to implement a new way of doing business and their approach to acquisition. This represents the challenge for decontamina-

tion technology and business practice. The assessment was more painful for the JSSE team who had invested considerable time and energy into solvent wash technology than it was for the JPID team that had just started Milestone A. Meanwhile, the JPID team, based at Brooks City Air Force Base, San Antonio, TX, struggled to define the future of their program in the face of a Base Realignment and Closure decision -- a recipe for turf fighting and zero progress. However, under JPMD's guidance, the laid the foundation for what would become the Joint Material Decontamination System (JMDS) to manage and integrate one technology across both JSSE and JPID requirements.

In May 2006, Maj. Gen. Reeves signed the Acquisition Decision Memorandum to formally embrace vaporous decontamination technology for sensitive equipment and platform interiors decontamination. This decision set off a fury of rapid actions by Mr. William Hartzell (present Joint Project Manager, Decontamination) to officially stand up the JMDS team, resulting in a program Milestone B decision six months later on October 23, 2006. The JMDS team released a Request for Pro-

posing two Advanced Technology Demonstrations (ATD) in 2008 will integrate matured technologies into JMDS. The end result will be vaporous decontamination prototypes for Operational Assessment and Logistics Demonstration. Milestone C, Low Rate Initial Production, is scheduled for late 2009.

The JMDS is at the leading edge of a transformation in decontamination that spans research, program management, testing, engineering, and logistics. It's a new way of doing business that challenges the traditional process. The program success in the past year could not have happened if not for the leadership of JPEO-CBD, JPM-Decontamination and the determination of the team to meet new challenges. The JMDS team is focused on continuing their earlier successes and keeping the momentum going as they turn concepts into tangible results for the Warfighters quickly, affordably and supportably. With JMDS, the next 25 years of decontamination capability is being written today.

If you have any inquiries on the JMDS program, please send them to the JMDS Program Manager, Mr. Kaminsky, at [steven.kaminsky@us.army.mil](mailto:steven.kaminsky@us.army.mil). 





## Warfighters Say Joint CBRN Dismountable Reconnaissance System Limited Objective Experiment Closes the Gap in Dismounted Reconnaissance

By Stephen Gude  
Assistant Editor

**T**he Joint Chemical Biological Radiological Nuclear (CBRN) Dismountable Reconnaissance System (JCDRS) Limited Objective Experiment (LOE) represents a Chemical and Biological Defense Program effort to eliminate the dismounted CBRN reconnaissance, assessment and surveillance gap within the Joint Forces.

According to three Warfighters who recently participated in a system demonstration during JCDRS LOE VIP Day event at Fort Belvoir, VA, the gap is eliminated.

“The purpose of this LOE is to see how the JCDRS fills the gap with commercial-off-the-shelf (COTS) equipment when it comes to detection,” said Senior Airman Jessica Fritz, an emergency management specialist at Pope Air Force Base, NC. “A big portion of that gap has been the detection and identification of toxic industrial chemicals (TIC) and toxic industrial materials (TIM). We like the new equipment they’ve come up with to improve our results in detection and identification, and we like the integration of the COTS equipment with what we use now.”

“This new equipment is easier to use, quicker, faster and more precise,” said Sgt. Isaac Franco, who commands a FOX Nuclear, Biological and Chemical Reconnaissance Vehicle with the 61st Chemical Co., Fort Lewis, WA. “The suite of equipment allows us to not only detect chemicals, but identify these chemicals, which helps us make on-the-spot decisions.”

During the JCDRS demonstration, Warfighters demonstrated the JCDRS to a large group of guests, including Mr. Jean Reed, the Special Assistant for Chemical and Biological Defense and Chemical Demilitarization Programs; Maj. Gen. Stephen V. Reeves, the Joint Program Executive Officer for Chemical and Biological Defense; Brig. Gen. Thomas Spoehr, the Commandant of the Army Chemical Defense School, and other guests and stakeholders from U.S. and foreign CBRN-related commands. The guests spoke to the Warfighters, inspected some of the sensor equipment, observed demonstrations and received short briefings on the experiment.

Fritz, 24, of West Palm Beach, FL, worked the first two phases of the LOE. She noted how the new gear is compatible

with the equipment warfighters currently use. “I have a pretty good amount of experience with the equipment that has already been fielded,” said Fritz, who has been in the Air Force for four years. “All of the new equipment is very easy to integrate into what we already have.”

Integration – closing the gap between new technology and old – is the key to the functionality of the JCDRS, Fritz said. A key JCDRS capability is to detect, sample and identify TICs and TIMs, and that capability enhances warfighting effectiveness.

“The JCDRS gives us a platform for a new way of doing dismounted recon,” said Franco, a 24 year old native of Midland, TX. “It used to be that we couldn’t get down and identify agents, suspicious leaks from unexploded ordnance or TICs and TIMs that might be leaking. This new platform cuts out the barrier to precision – we don’t just use M8 paper on a stick. The equipment we have here is more precise.”

The suite of precision sensing equipment in the JCDRS includes chemical agent and TIC detectors, gas monitors, chemical-





**Warfighters prepare to begin the JCDRS LOE at Fort Belvoir, VA**


biological sampling kits and radiological identifiers (neutron and gamma radiation). Senior Airman Scott Arrington, a 23-year-old emergency management specialist from Dyess AFB, TX, agreed with Franco about the equipment's precision.

While the LOE's objective was to demonstrate COTS equipment integration with government-off-the-shelf equipment,

Fritz found that the human factor was just as important as other phases of the LOE included robotics testing. "There were pros and cons with the robotics," she said. "A significant advantage is robots can operate in an oxygen-deficient environment or in an area humans can't enter. They are also not prone to fatigue, hunger or any human need.

"On the other hand," she continued, "perhaps due to the low-to-the-ground nature of the robots, we got different readings. The bottom line is humans have to be involved in every aspect in order to make this work properly."

Franco has already ramped up his involvement, training personnel at Fort Lewis. His unit works with the state homeland security department, and he has trained Soldiers on what he has learned with the JCDRS. "That's what it is all about, knowing that if a man goes down, someone can step up and do the same things effectively. This suite is easy to learn, and that makes it easy for us."

The three Warfighters consider the detection gap closed. "This system is not only going to make our jobs easier," Arrington said, "but it is going to make us better at doing our jobs. There's no room for error when you do what we do." 



**During the JCDRS demonstration, Warfighters used a wide array of equipment, including self-contained breathing apparatus, a modular base unit for the Holster Concept, an Ahura spectrometer repackaged with a Global Positioning System built into its spine and other sensors.**

Photos by: Courtney Maisch



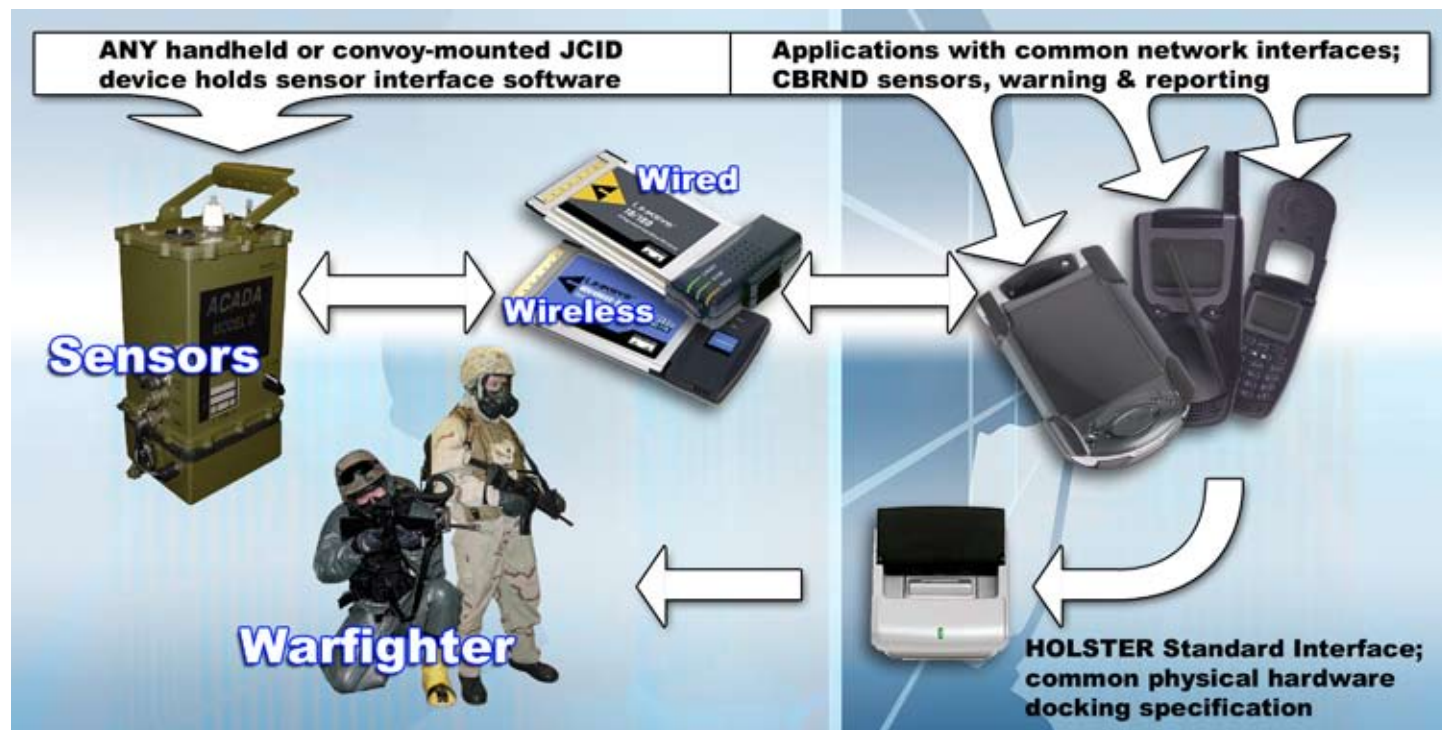
# Chemical and Biological Threat-Detection

By Marion Ceruti, Ph.D., JPEO-CBD SSA Science & Technology Documentation Lead

The Science and Technology (S&T) group of the Joint Program Executive Office for Chemical and Biological Defense (JPEO-CBD) Software Support Activity (SSA) provides technical expertise for the transition of Information Technology (IT) S&T products into JPEO-CBD programs. Efforts are underway throughout the nation to advance the state-of-the-art of Chemical, Biological, Radiological and Nuclear Defense (CBRND) systems. This article explains some of the technology involved in advancing and integrating

major thrusts. One is the development of new, next-generation individual and arrayed chemical and biological sensors. The other is the integration of these sensors into a network in which intelligent software agents, data-fusion algorithms, and expert systems can enhance the user's ability to retrieve and understand the data, and to act efficiently on the results.

Various research projects also can be applied to improvised explosive device (IED) detection, which is difficult due to the many forms in which they can be manufactured and deployed.



**FIGURE 1:** JCID/Holster sensors and their interfaces implemented with Personal Computer Memory Card International Association (PCMCIA) external / internal "cards" independent of specific platform using wired or wireless networks.

development of the ultra-sensitive Surface-Enhanced Raman Spectroscopy (SERS)-based hardware, the Knowledge Amplification by Structured Expert Randomization (KASER) anthrax detector, the Joint Warning and Reporting Network (JWARN) Component Interface Device (JCID)-on-a-chip firmware, and the Holster sensor-network infrastructure. This research has two

However, they all have explosives that emit gases subject to detection. This research can lead to the technology transition of efficient methods of detecting these gases rapidly enough for the Warfighter to take evasive action. Lighter, smaller, less-power-hungry CBRND sensors are needed. One operational application is to provide convoys small, portable devices



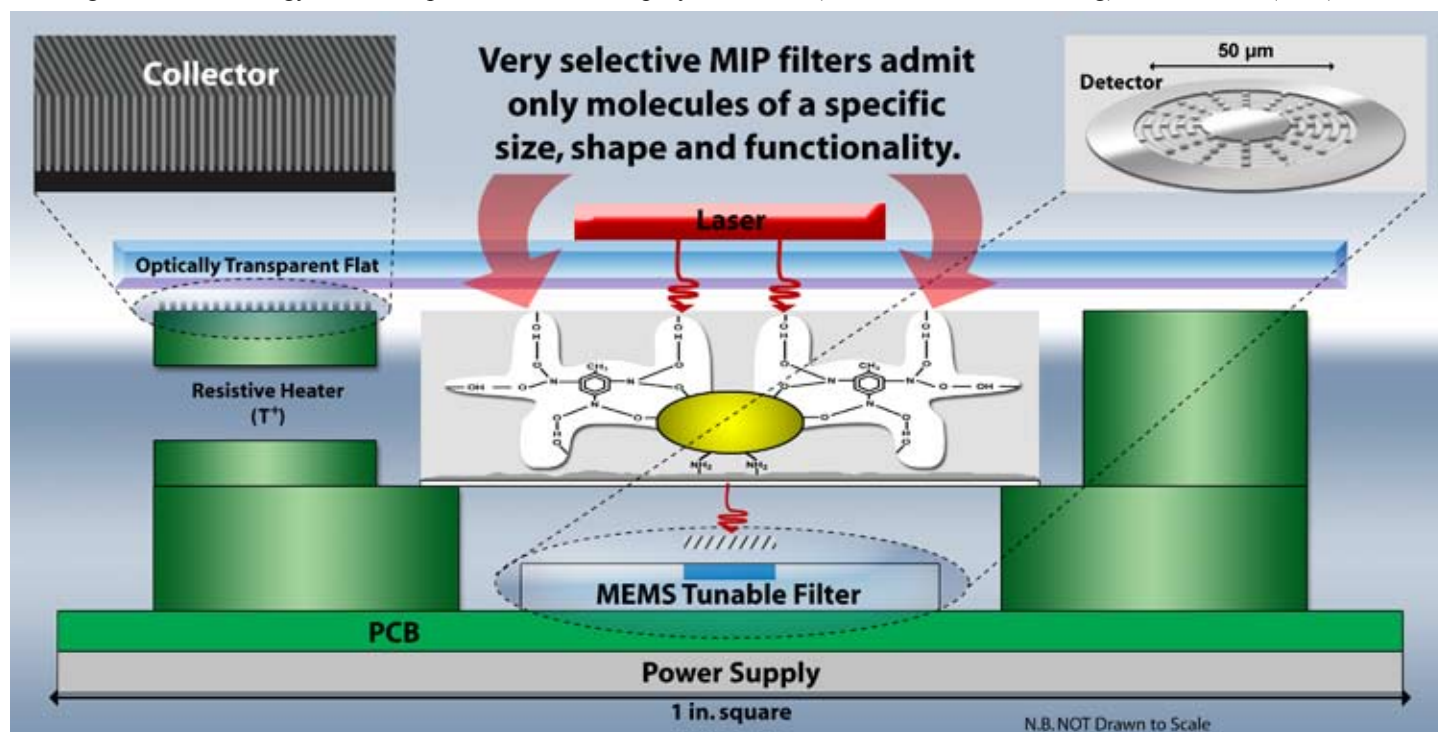
# Systems of the Future

that use commercial off-the-shelf (COTS) compact, wireless technology. The Warfighter can customize and modernize these new capabilities independently of other capabilities. For example, since the detectors are lightweight and require low power, power capabilities and capacities of vehicles do not need modifications to accommodate them. Warfighters in the infantry can carry them into battle easily using the equipment with which they already deploy. Other possible applications that have significant technology transition potential include deploy-

will incorporate new sensor miniaturization technology. The transition of the technology in this research is aimed at supporting convoy and individual safety on the battlefield.

## JCID-on-a-Chip and Holster

The first technology is the JCID-on-a-chip software technology represented in Fig. 1. David Godso (JPEO-CBD), Charles Datte (then of Sentek Consulting), Ritesh Patel (SSA), Franc-



**FIGURE 2: Fabry-Perot sensor with combine MEMS tunable optical filters with MIPs for SERS.**  
(U.S. Patents 6,581,465, 6,550,330, 6,546,798 and 6,763,718; Navy Case Nos. 96659, 84769, 84715, 84774, and 98184)

ment of lightweight, low-power sensors on Unmanned Airborne Vehicles (UAVs) without affecting the power requirements of the UAV propulsion systems. Moreover, arrays of these sensors can act in concert providing more powerful capabilities than individual sensors. Miniaturized hardware will achieve this degree of integrated small-footprint capability. Future research

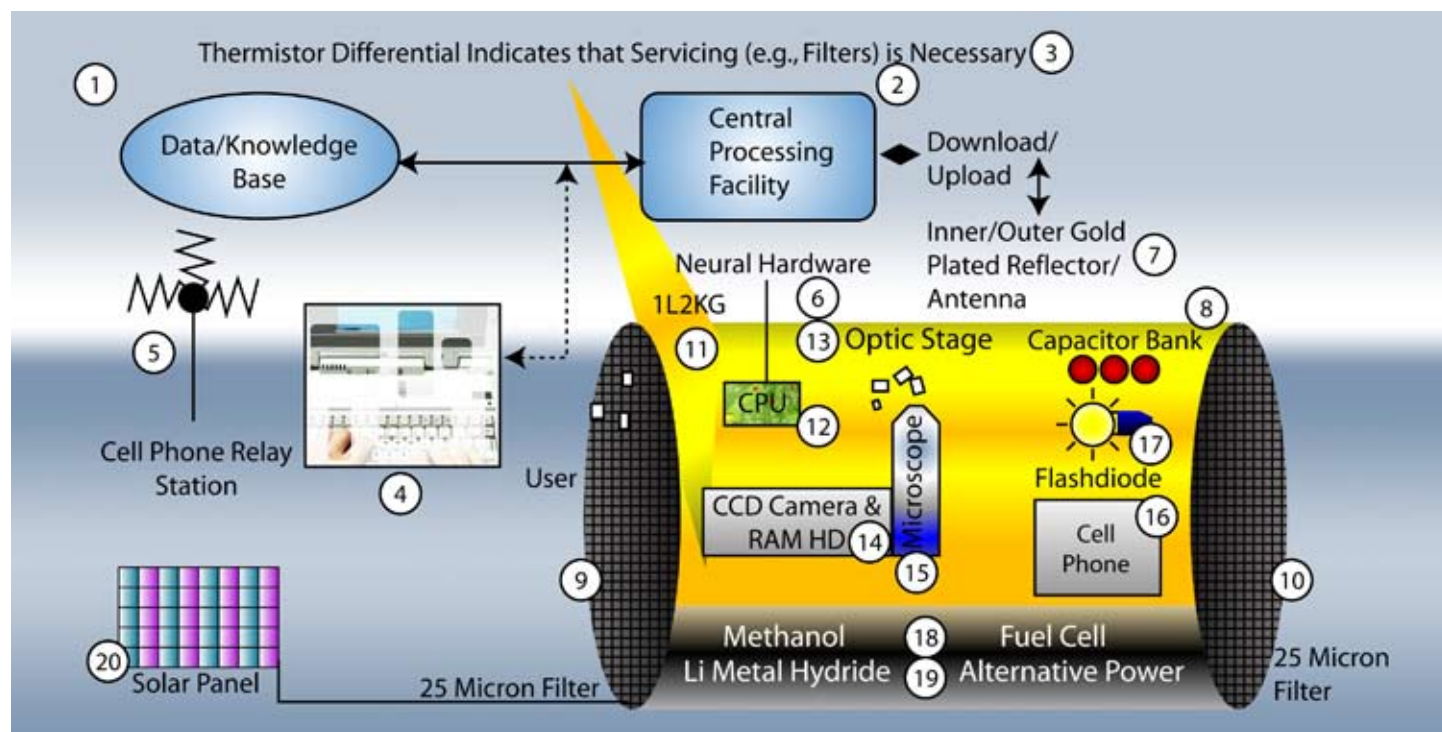
esca Mirabile (former member of SSA architecture team) and Jeffrey Steinman, Ph.D. (CEO WarpIV Technologies, Inc.), have described network-ready CBRND sensors in an Institute of Electrical and Electronics Engineers (IEEE) conference paper, and are points of contact for this technology. “JCID-on-a-chip” is the subject of a current project to develop a software-



defined sensor concept, architecture and approach to modular CBRN and Explosives (CBRNE) sensors. Thus, any hardware devices can be used in a “plug-and-play” mode. JCID can support the ability to load to field-programmable, gate-array-supported sensor hardware platforms as well as other types of software-based chip sets.

Holster is a key component in the network-centric CBRNE information technology of the future because it provides a common interface for many different types of sensors, some of which are still under development. Holster represents an important step forward in modular information technology management. Future systems will need this plug-and-play capability because the sensors can be developed independently of the information system that uses their data. Not only sensors, but also software, such as user-interface applications, network-centric data-fusion applications, their transition environments and

and biological agents. The technology combines novel MEMS dual-cavity Fabry-Perot spectrometer design with Molecular-Imprinted Polymer (MIP) coating for Surface-Enhanced Raman Spectroscopy (SERS) analysis, as illustrated in Fig. 2. The same easily deployable automated system will be reconfigured to detect new chemical and biological threats, and possibly nuclear threats. The spectrometer consists of a monolithic implementation of Fabry-Perot interferometer and a photodiode on the same integrated circuit substrate. The interferometer uses two parallel and optically flat mirrors separated by an air gap. When light of a specific wavelength shines on the surface of a resonance-configured mirror, most of light is transmitted through the interferometer. If all of these conditions described above are not met, hardly any light is transmitted. For example, if the wavelength or the spacing between the mirrors is altered, far less light is transmitted, thus decreasing the associated cur-



**FIGURE 3: KASER sensor for anthrax and IED detection. Data are fused using a knowledge amplifier for more sensitivity than that of individual sensors as automatic feature extraction increases gain. U.S. Patents 7,006,923 and 7,082,369.**

other network-centric applications can be developed independently by different groups and integrated using the common Holster standard interface. This represents a significant cost savings because it obviates the necessity to retrofit applications so they can interoperate in the net-centric environment.

### SERS-Based Micro-Electro-Mechanical Systems (MEMS) Sensor System

Pamela Boss, Ph.D. and Richard Waters, Ph.D. are two researchers who are developing an exciting class of key sensors that can detect both chemical and biological threats. These sensors use coupled-cavity Micro-Electrical-Mechanical Systems (MEMS) (U.S. Patents 6,581,465, 6,550,330, 6,546,798 and 6,763,718; Navy Case Nos. 96659, 84769, 84715, 84774, and 98184) in a small (<0.5 in<sup>3</sup>), low-cost, highly sensitive less than parts per billion (<ppb), reliable device capable of nearly real-time (<60 sec.) simultaneous detection of multiple chemical

rent in the photodiode that collects the transmitted light and converts it into electrical current. Therefore, the change in photodiode current is related to the change in mirror displacement, and hence, a change in spectral intensity at the specific wavelength. The spectrometer hardware demonstration will include fabrication of the MEMS-based spectrometer and the creation of the SERS-active coatings using MIPs.

Because the SERS-MEMS sensors produce data that can be sent anywhere, they will fit into the Holster standard-interface architecture. The transition of these sensors will give convoys and individual Warfighter a significant edge in their detection capabilities without adding additional significant weight.

### KASER-Based Anthrax Detector

Stuart Rubin, Ph.D. is another scientist who is working on a different type of next-generation sensor to detect biological threats using KASER technology (U.S. Patents 7,006,923



and 7,082,369). This sensor, which is depicted in Fig. 3, can be modified to detect chemical threats associated with IEDs. The increased sensitivity of these sensors is due to amplified detections using innovative artificial-intelligence and data-fusion techniques. Automated feature extraction increases gain to outperform current technologies. The evolutionary feature of the learning system allows for detection of new explosive formulations. Signatures can be communicated via radio or

not just the anthrax detector. The intelligent network centrality in the KASER design will result in better, more advanced data-fusion applications to assist the Warfighter in understand situations and threats.

The wireless firmware-reconfigurable JCID sensors will be integrated with the MEMS spectrometer, KASER system in a supporting environment called Holster. Holster provides hardware packaging and connectors, electrical power, and common

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## ***Because the SERS-MEMS sensors produce data that can be sent anywhere, they will fit into the Holster standard-interface architecture.***

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cell phone. A processing facility collects the reports from each deployed unit. These reports, which are downloaded automatically, are saved in a database where they are mined periodically (e.g., hourly) to discover pattern anomalies.

The patterns generated by these distributed sensors are analyzed using a knowledge-based inference engine, such as a KASER to pinpoint the sources and causes of contamination and to predict the areas in need of evacuation or other counter-measures. This function will support and interoperate with JWARN. The KASER detector system can fuse multiple heterogeneous sensor data observed weather patterns, satellite imagery, passenger flight manifests and intelligence reports. The system can operate in extreme climates unattended for at least a month powered by solar, battery or fuel cells. The cost of fabricating custom integrated circuits will not be incurred because high-speed, wide-bus chips will be programmed with Dr. Rubin's patent-pending improvement invention for the patented KASER algorithm for performing network-centric sensor fusion.

Currently available CBRN sensors have widely varying interfaces making system integration and networking complex. Progress in software radio technology has demonstrated that updatable and reconfigurable hardware devices can be built to support a variety of different digital circuit and interface protocol implementations. They accomplish this by downloading and booting firmware into the field-programmable memory and gate array integrated circuits within the device. The same technology can be used to solve the CBRN sensor integration problem. Software will allow configurable I/O translation modules to be loaded dynamically into the final hardware platform, which also will contain the Ultra-Sensitive sensors based on MEMS technology and other highly sensitive sensors, such as the KASER anthrax detector. Future research will extend the JCID-on-a-chip effort to exploit these combined technologies in a common data backbone using the Holster common interfaces in a net-centric environment. KASER intelligent sensor-fusion applications can process data from a wide variety of sensors,

services including plug-and-play configuration, communication protocols, information assurance, and wireless networking infrastructure to integrate CBRN sensors. Holster supports scaleable and upgradeable modules through a software-based approach, all evolving toward a common sensor platform baseline that can accommodate any CBRNE sensor in a plug-and-play architecture. The demonstration will include the ability to use any configuration of JWARN sensor network; the ability to deploy sensor networks of different configurations; and the ability to share sensor data simultaneously with JWARN and other CBRN users on the fly without interrupting other applications to support a net-centric environment. Successful development and integration of these sensors will result in a revolutionary system for chemical-biological identification with performance far superior to current systems. The final integrated devices will be lightweight, low cost, deployable in arrays and capable of detection with little temperature or humidity sensitivity with potential operational applications in decontamination monitoring as well as in predictive analysis.

### **The Need Continues for Joint Chemical and Biological Research**

Meriah Arias-Thode, Ph.D., of the JPEO-CBD SSA S&T group attended the Association of the United States Army conference in Washington, D.C. October 9-12. During the conference, she talked with several personnel working on chemical and biological defense. For example, she learned: 1) The real topic of concern is chemical and biological hazards as well as toxic industrial chemicals and materials, which appear at this time to be more of a threat than are nuclear weapons and 2) The Army needs improvements in chemical and biological defense. JPEO-CBD and the SSA S&T group continue to pursue improvements in CBRND systems through the introduction of new technologies. For more information, please contact the SSA S&T Lead, Dr. LorRaine Duffy, [lorraine.duffy@navy.mil](mailto:lorraine.duffy@navy.mil). 

# Modeling Simulation

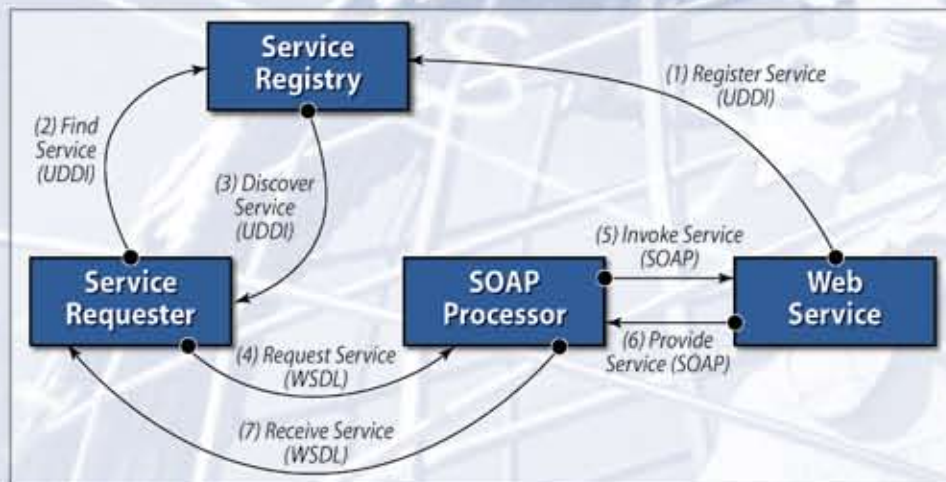
## in a Service Oriented Architecture (SOA) World

By Jefferey S. Steinman, Ph.D., Software Support Activity Integration and Test Team

Service Oriented Architecture (SOA) information technologies are being vigorously pursued by the Department of Defense (DoD) to facilitate the net-centric transformation. The vision of Network Centric Operational Warfare (NCOW) is to allow information systems such as wireless hand-held devices, sensors, intelligence providers, assorted databases, weather services, and command and control systems to seamlessly interconnect and exchange data through the Global Information Grid (GIG). SOA provides the methodology and communication services necessary to support plug-and-play interoperability. The primary focus on SOA has been to support operational systems (see Figure 1). While some ongoing research and development is currently focused on applying web technologies to Modeling and Simulation (M&S), the full understanding of SOA in regard to M&S is still being formulated. A continuing challenge is to understand how SOA technologies that provide plug-and-play interoperability in the operational world relate to Modeling and Simulation (M&S).

A key distinction between real-world operational systems and simulated systems is in how time is managed between the applications. Operational systems operate in real time. Simulated systems may also operate in real time, but they frequently operate in simulated time. For example, it may be necessary to run a simulated combat scenario as fast as possible to support analysis of existing system performance, acquisition of future systems, live decision making, or operational planning. This could take minutes or days to complete in actual time. Time-managed simulations run independently of the wall clock.

Some operational systems have very specific timing requirements and must make



**FIGURE 1: Web service provided between operational systems in real-time. Services are registered and discovered using the UDDI standard. Services are defined in XML through the WSDL standard. The SOAP process the WSDL messages to invoke the requested service. The data model used to standardize information flowing between the web applications is described in XML Schemas.**

use of time-based scheduling services to coordinate their activities. However, many operational systems simply receive, process and generate data without strict time-scheduling requirements. Other operational systems are event-driven in the sense that they follow well-defined business rules that dictate patterns of interplay between applications.

In the simulation world, advanced simulation engines allow models to receive, process and generate new events at precisely defined simulated times. To maintain causality, a scheduler is embedded within the simulation engine to manage event processing. The job of the scheduler is to ensure that all time-tagged events are locally processed within the simulation in ascending time order. In most cases, the scheduler simply activates and processes the next local event with the earliest time stamp.

Distributed simulations, sometimes called federations, are constructed by combining multiple simulations into an

integrated system interoperating on multiple computers connected by a network. Distributed simulations mutually receive, process and generate new events between themselves as simulated time evolves. The challenge is to coordinate the event-related activities of each simulation without violating causality. For example, if one simulation advances too far ahead in its simulated time, it may be possible for another simulation to generate an event in its past, thus violating causality. Correct and repeatable simulations must address this fundamental synchronization problem.

The technology to time-synchronize distributed simulations without serializing their run-time performance has been a hot topic of research over the past 30 years. The most sophisticated strategies use rollback techniques to aggressively process events without regard to straggler messages that might be received from other simulations late. When such straggler messages arrive from other simulations, the simulation engine automatically



rolls back all of the optimistically activated events that were processed out of order. Rollback-based event processing requires a sophisticated simulation engine to coordinate event processing and rollbacks. Conservative techniques that do not involve rollbacks are simpler to implement, but they almost always limit how tightly in time distributed simulations may interact. This constraint often affects the validity of the results, which leads to the difficult tradeoff of having to choose between run-time performance or accuracy, but not both.

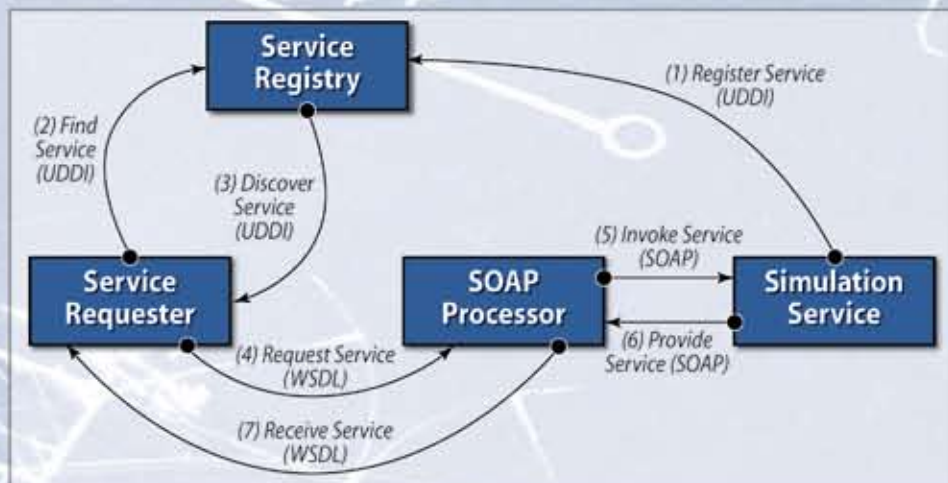
Distributed time-synchronization capabilities are not normally embedded in operational SOA frameworks. This raises the question, "How does M&S fit in the emerging NCOW environment?"

To further confuse the subject, some simulation tools provide stand-alone services that generate CBRN plumes, help plan operations, determine courses of action, etc. Such stand-alone simulations or federations are able to provide their services in an operational SOA setting because they do not exchange events in simulated time with other external systems (see Figure 2). These kinds of simulations essentially run their scenario from start to finish and then provide the results to the requester of the service. An example of this is the Joint Effects Model (JEM) that provides simulated CBRN plumes to a wide variety of applications.

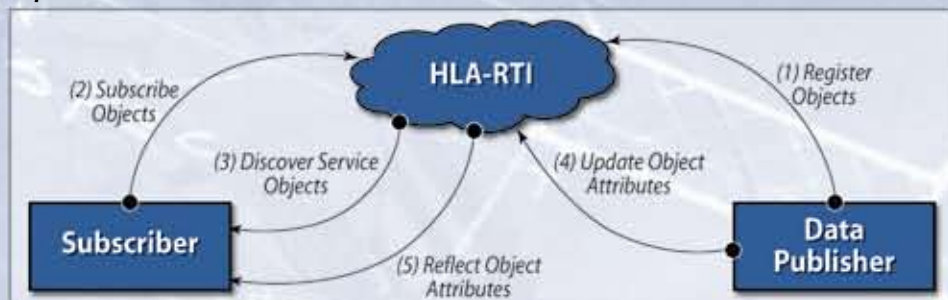
In contrast, a federation of networked simulations requires a unique run time infrastructure with specialized technologies and capabilities to coordinate the distributed event processing activities between the various simulations in simulated time. These technologies not only exist today, but their capabilities resemble many of the same kinds of services prescribed in SOA!

Modeling & Simulation (M&S) interoperability standards such as the High Level Architecture (HLA, see Figure 3, and Figure 4) coupled with advanced modern simulation engines are able to provide plug-and-play interoperability between models and simulations in a SOA-like environment. A high-level comparison of SOA and HLA services is described in Table 1.

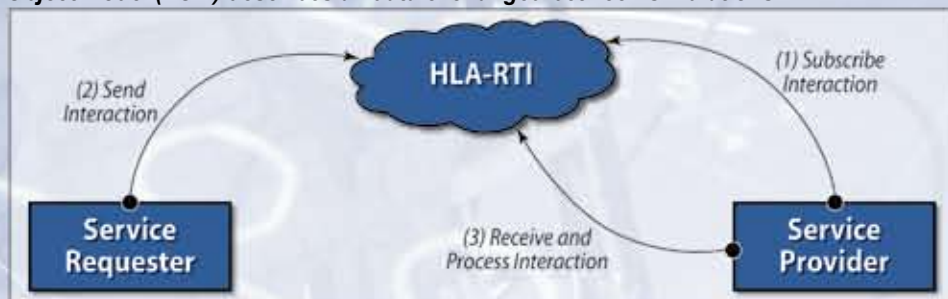
While there are many similarities between HLA and SOA, it is important to keep in mind that these are different and separate architectures. Each applies very different technologies to provide its



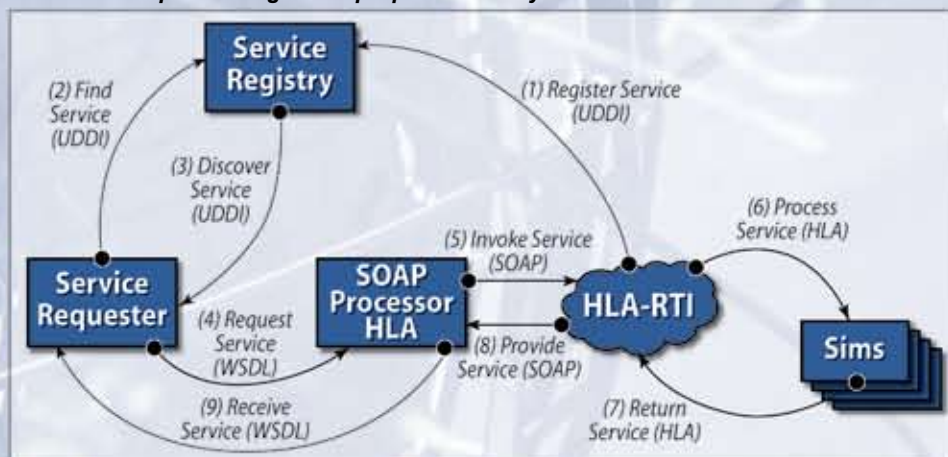
**FIGURE 2:** Stand-alone simulations can implement web services to support external requests for simulation services.



**FIGURE 3:** HLA data publishing services are provided by the HLA Run Time Infrastructure (RTI) to support data exchanges between simulations. The Federation Object Model (FOM) describes all data exchanged between simulations.



**FIGURE 4:** HLA one-way interaction services provided between simulations. The HLA-RTI delivers the interaction to all subscribers where the interaction is processed. The HLA does not provide a general-purpose two-way interaction service.



**FIGURE 5:** SOA and HLA real-time services can be provided in an integrated system. One issue that must be addressed is how to unify/translate XML-based data models with HLA-based FOMs. A specialized HLA/SOAP processor operating as a gateway between operational systems and M&S applications can bridge these two worlds together. The next-generation version of HLA is developing direct interfaces implemented as web services using underlying HLA-RTI technologies and existing infrastructures. However, some serious performance issues have not yet been resolved.



# Modeling & Simulation (Cont'd)

services. Additional capability is needed to integrate (1) distributed simulations using HLA or other distributed simulation mechanisms to coordinate collective event processing over time, with (2) operational systems requesting simulation services through SOA interfaces in real time (see Figure 5). Yet, it is possible for these two worlds to come together in many ways. For example, the representation of data exchanged between applications through a common XML-based data model is already being investigated.


Two final thoughts relating and contrasting M&S and operational systems should be mentioned.

First, modern simulations can be understood as software programs that are internally composed of interacting models. The models themselves are not programs. Rather, they are the building blocks of simulations. Models require a simulation engine to coordinate how they perform their mutual event processing while advancing in time. To maximize interoperability and reuse, a SOA-like framework is needed to support course-grained interoperability between simulations and finer-grained interoperability between models residing within simulations. While HLA supports many SOA concepts at the simulation level, an additional model-level composable infrastructure is needed to fully achieve the realization of interoperable plug-and-play models. This is much like the dilemma faced by many opera-

tional systems in their attempt to provide functionality in a SOA environment. The decomposition strategy for legacy systems is not always straightforward in deciding how to break up internal capabilities into modular SOA services, especially when those services also tightly interoperate together within the application.

Second, M&S tools are very often computationally intensive, especially when high fidelity models with demanding processing requirements are needed. Either the simulation runs too slow, or it gets bogged down when supporting scenarios with large numbers of entities. Overheads involving XML parsing may be excessive in supporting interactions between tightly coupled models. Massively parallel supercomputers with large numbers of processors and extremely high-speed communications are often used to alleviate the performance problem. Parallel simulation engines optimized for scalable performance on large scenarios support many of the same capabilities as HLA, but with high-tech time management capabilities to automatically support conservative and optimistic processing. To achieve scalability for large scenarios, both data and computations are distributed and carefully coordinated among the processing nodes. With this in mind, parallel simulation fundamentally deviates from the loosely coupled distributed simulation approach and from the SOA approach because parallel processing does not generally permit

additional compute nodes to either join or for existing nodes to resign from the parallel execution. Despite these differences, there is still a striking similarity between parallel supercomputing and network-based distributed simulation technologies.

In conclusion, future M&S frameworks will eventually support plug and play interoperability of both models and simulations using SOA-like techniques across networks and supercomputers. The end goal is to (1) dramatically reduce the cost of integration by promoting interoperability and reuse both at the model and simulation level, (2) provide scalable processing and seamless interoperability on a wide variety of computing and network environments, and (3) support the operational world by providing simulation services to test-range and real-world systems. However, because M&S requires mutual time synchronization, the technologies and infrastructures hosting simulations is very different from the SOA technologies and infrastructures used to interconnect operational systems. 

SOA CAPABILITY (web services)	M&S EQUIVALENT (HLA)
Dynamic registration of services and/or data that can be discovered by other systems through Universal Description Discovery Integration (UDDI).	Dynamic creation of federation objects that can be discovered by other simulations and models.
Specification of the data model through XML schemas.	Specification of the Federation Object Model (FOM) through the Object Model Template (OMT).
Representation of the data exchanged between applications as XML documents.	Attribute and parameters are packed into variable-length messages instead of using fixed-length message structures.
Abstraction of how services are defined and implemented using Web Service Description Language (WSDL).	The FOM specifies all interactions capable of being supported by the federation. Base Object Models (BOMs) further specify the interplay between models.
Framework to activate software services in response to a remote service request using Simple Object Access Protocol (SOAP).	Simulations map the processing of event messages received from other simulations into their own environment. Advanced simulation engines automate the mapping and allow models to dynamically register their own handlers to process received messages.

**TABLE 1:** SOA capabilities using standard web services and the corresponding M&S equivalent capability using HLA and advanced simulation engine technologies.





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2007 Green Dragon Ball Committee, Mr. Rick Decker presiding.



# an OVERVIEW of Chemical/Biological Decontamination

By Dr. C. Daniel Rowe, JPM Decontamination, S&T Advisor; Mr. John A. Steiner, JPM Decontamination, S&T Advisor and Ms. Kristina Lisowski, JPM Decontamination, S&T Advisor

**A**lthough the scientific principles for decontamination have been established for only 150 years, decontamination practices date back to ancient times. Guidelines for personal cleanliness, diet, waste handling and disease quarantine were provided in biblical times. To avoid contagion, instructions were given to ancient soldiers to move campsites daily and to disinfect equipment with fire when returning from battle. Alexander the Great required his armies to boil drinking water and bury animal waste. One of the first known decontaminant applications was by the ancient Greeks who burned sulfur to form sulfur dioxide for fumigation. Centuries later, during the Great Plagues of the Middle Ages, bodies and clothes were burned and sulfur dioxide was used both as a fumigant as well as a food preservative. Early approaches to decontamination included both removal methods (water, steam, absorbent materials e.g., fuller's earth, clay, soil, etc.) as well as neutralization methods (lime, sulfur dioxide).

Removal and neutralization are both still considered valid approaches.

The first person to knowingly use a chemical to kill a microorganism was Antony van Leeuwenhoek. In 1676 the Dutch drapery merchant constructed a microscope and used it to observe tiny moving animals that he found by scraping film from his teeth. The animals died when he exposed them to vinegar. Louis Pasteur's genius and devotion created the science of microbiology and he had to battle ignorance and prejudice to convince physicians that invisible microorganisms caused disease. Pasteur's work inspired Joseph Lister to establish the science of antiseptic surgery that saved countless lives and, in 1867 reduced the infection rate from 90% to 15% in one hospital. Prior to World War II more Soldiers died from infection than directly from their

battle related injuries.

The use of chemical and biological warfare (CBW) weapons as a means of waging war dates as far back as the sixth century B.C. when food poisons and contaminated corpses were used to infect opponents. One early battlefield decontaminant was lime (calcium oxide) employed in the 1400s to decontaminate rotting corpses. During World War I (WWI), German troops introduced large scale CW using chlorine and blister (mustard) agent. Germans conducted hundreds of chemical attacks by releasing gaseous chlorine from thousands of cylinders (see Figure 1). These attacks killed thousands and opened gaps in Allied lines as wide as five miles. Consequently, during WWI, battlefield decontamination became a major concern. The first battlefield decontaminant to receive widespread use

was bleaching powder (calcium hypochlorite). During WWI blister agent would collect in puddles and was persistent enough to remain dangerous for months. Even today, blister containing munitions are



**FIGURE 1: Release of Chlorine Gas During World War I**



**TABLE 1**  
**CONSIDERATIONS IN SELECTING A DECONTAMINANT**

<b>Property</b>	<b>Parameters to be Considered</b>
Efficacy	<ul style="list-style-type: none"> <li>• Broad spectrum of use (effective at neutralizing/removing chemical hazards, biological hazards, TIMs, toxins and other specific hazards)</li> <li>• Penetrate materials and crevices to be decontaminated but not persist (in the environment, on the skin or as a residue)</li> </ul>
Material Compatibility	<ul style="list-style-type: none"> <li>• Compatibility with any materials it contacts</li> <li>• Compatible with food materials</li> <li>• Compatible with plastics, fabrics/fibers</li> <li>• Introduce minimal or no decrement in equipment performance (i.e., color change, embrittlement, swelling, etc.)</li> <li>• Compatibility with existing CB detection equipment</li> <li>• Leave no undersirable residues</li> </ul>
Safety	<ul style="list-style-type: none"> <li>• Must be safe to both personnel and the environment (skin, respiratory)</li> <li>• Should not require specialized protective equipment to use</li> <li>• Transportability (easily transportable via air, land or sea)</li> </ul>
Ease of Use	<ul style="list-style-type: none"> <li>• Cycle time (how long it takes to be applied, how long to effectively decontaminate)</li> <li>• Ease of preparation (ease if mixing, equipment required to prepare, etc.)</li> <li>• Ease of application (labor requirements, applicator equipment required to apply)</li> <li>• Operational characteristics at environmental extremes (temp, humidity)</li> <li>• Coverage (mass of decontaminant required per area to be decontaminated)</li> <li>• Indications as to when decontamination is complete/incomplete (safe/unsafe)</li> </ul>
Storage/ Shelf Life	<ul style="list-style-type: none"> <li>• Required storage conditions</li> <li>• Loss of efficacy with time, temperature, humidity</li> </ul>

unearthed from French farm lands which contain potent mustard agent. Bleaching powder effectively neutralized blister agent residues and was thus used in large quantities in WWI.

From the military perspective, decontamination is the removal and/or neutralization of hazardous levels of CB contaminants from personnel, materials, equipment, buildings and the environment (see Figure 2).

Military decontamination requirements have now been expanded to include removal/neutralization of toxic industrial materials (TIMs). As a result, to be an effective CB decontaminant requires a material to have a broad spectrum efficacy on chemicals, biologicals, toxins and TIMs. Since a single decontaminant is not appropriate for all scenarios, the decontaminant employed will depend on the hazard present. Selecting an ideal decontaminant requires the review of numerous interrelated parameters as depicted in the following (see Table 1).

Certainly active chlorine compounds were relied on heavily through the 1950s and continue to play a major role in military decontamination operations (see Table 2). Bleaching powder, chloramine, chlorine dioxide, Fichlor (chlorocyanuric acid) and other chlorine containing compounds have been employed in a variety of solvents, ointments and sprayer applicators since the 1920s. With an eye

toward improving material compatibility, after a decade of development in 1960 the Army replaced Decontaminating Agent Non-Corrosive (DANC) with Decontaminating Solution 2 (DS2) due to DANC's corrosivity. But DS2 suffered from safety issues as well as material compatibility issues. Consequently work continues to focus on fast-acting decontaminants that are compatible with today's new materials and are safe to use. In 2002 the military partially replaced DS2 with M100, a sorbent powder that uses removal rather than neutralization as the primary decontamination approach. The M100 eliminated the need for water and is both non-toxic and non-corrosive, a definite improvement over DS2.



**FIGURE 2: Environmental Decontamination Application**



**FIGURE 3: Application of Decontaminant Foam (DF200)**



**TABLE 2****SELECTED MILITARY DECONTAMINANTS (PAST AND PRESENT)**

<b>SUPER TROPICAL BLEACH (STB)</b>	
<b>Efficacy:</b>	Effective against L, V and G agents and BW agents
<b>Uses:</b>	Surfaces and wide-area decontamination
<b>Chemical Action:</b>	Active chlorine compound
<b>Composition:</b>	Calcium hypochlorite, calcium oxide (slurry with water to use)
<b>Form:</b>	White powder
<b>History:</b>	Standardized by Army in 1950, still in use
<b>DECONTAMINATING AGENT NON-CORROSIVE (DANC)</b>	
<b>Efficacy:</b>	Chemical biological warfare agents
<b>Uses:</b>	Equipment and surfaces
<b>Chemical Action:</b>	Active chlorine compound
<b>Composition:</b>	Chloramine in tetrachloroethane
<b>Form:</b>	White/tan powder
<b>History:</b>	Successor to Chlorinating Compound 1 (CC-1) in 1938, procurement stopped in 1958 (obsolete in 1972)
<b>DECONTAMINATING SOLUTION 2 (DS2)</b>	
<b>Efficacy:</b>	Effective against all chem-bio agents (however spores require extended contact time, may not kill 100% of spores)
<b>Uses:</b>	Decontamination of equipment and surfaces
<b>Chemical Action:</b>	Alkaline active ingredient is a propoxide (alkoxide)
<b>Composition:</b>	70% Diethylene Triamine, 28% Ethylene Glycol Conomethyl Ether (EGME), 2% Sodium Hydroxide
<b>Form:</b>	Clear amber solution
<b>History:</b>	Standardized in 1960, no longer actively employed
<b>M291 SKIN DECONTAMINATING KIT (SDK)</b>	
<b>Efficacy:</b>	Chemical warfare agents neutralizes nerve agents rapidly
<b>Uses:</b>	Decontamination of hands, face, neck, mask and gloves
<b>Chemical Action:</b>	Oxidation and absorbs agent for removal
<b>Composition:</b>	Ambergard XE-555 resin
<b>Form:</b>	Dark powder
<b>History:</b>	Type classified by the Army in the late 1980s
<b>M295 INDIVIDUAL EQUIPMENT DECONTAMINATION KIT (IEDK)</b>	
<b>Efficacy:</b>	Chemical warfare agents neutralizes nerve agents rapidly
<b>Uses:</b>	Decontamination of individual equipment
<b>Chemical Action:</b>	Oxidation and absorbs agent for removal
<b>Composition:</b>	Ambergard XE-555 resin
<b>Form:</b>	Dark powder
<b>History:</b>	Type classified by the Army in the late 1990s
<b>M100 SORBENT DECON SYSTEM (SDS)</b>	
<b>Efficacy:</b>	Effectively removes chemical warfare agents and reactive capabilities neutralize agents
<b>Uses:</b>	Decontamination of individual equipment, latches and hatches for immediate decontamination
<b>Chemical Action:</b>	Oxidation for nucleophilic substitution (elimination reactions)
<b>Composition:</b>	Aluminum oxide
<b>Form:</b>	Dark powder
<b>History:</b>	Type classified by the Army in 2002

To satisfy requirements for immediate skin and equipment decontamination, the military developed the M291 Skin Decontaminating Kit and the M295 Individual Equipment Decontamination Kit (cf. Table 2). The M291 is a wallet-sized kit containing six skin applicator pads; the M295 kit has four equipment wipe-down mitts. As the active decontaminant, both the M291 and the M295 employ Ambergard TM XE 555 which is a combination of three different ion-exchange resins.

Although a universal decontaminant has yet to be realized, one of the more recent additions to the military inventory, DF200, comes closest yet to being a general purpose decontaminant. DF200 combines foaming action with a strong oxidant (hydrogen peroxide) as the active decontaminant (see Figure 3). It has good material compatibility and has the advantage of being effective on both chemical as well as biological hazards. DF200 can be employed on equipment, vehicles, building surfaces and even terrain. DF200 has the additional advantages of being environmentally friendly and is able to be applied as a liquid or foam using a variety of applicators.


Recent chemical/biological warfare attacks in public venues have focused attention on decontamination practices. In 1995, the extremely toxic nerve agent sarin (GB) was released in five Tokyo subway trains during morning rush hour. Sarin is essentially odorless and colorless at room temperature. The Sarin released in Tokyo killed 12 people and injured thousands yet eight hours after the attack, a task force decontaminated the subways using a bleach solution. The subways were up and running later that day. In 2001, the United States experienced a bioterrorism attack when letters containing anthrax were sent through the postal system to several targets. These events led to an unprecedented large-scale decontamination effort. Most notably, the Hart Senate Office Building, exposed to a potent form of anthrax, was decontaminated with chlorine dioxide and DF200. The Hart Building was successfully decontaminated and returned to full working order. Also in 2001, an anthrax-contaminated post office facility in Sterling, VA was effectively decontaminated using vaporized hydrogen peroxide. The search continues for fast-acting decontaminants that satisfy the ever increasing demands for



TABLE 2 (Cont'd)

## SELECTED MILITARY DECONTAMINANTS (PAST AND PRESENT)

DECONTAMINATION FOAM 200 (DF 200)	
<b>Efficacy:</b>	Chemical and biological agents
<b>Uses:</b>	Decontamination of equipment, surfaces, and wide areas
<b>Chemical Action:</b>	Hydrogen peroxide based oxidation
<b>Composition:</b>	Quaternary ammonium compounds, hydrogen peroxide and diacetin
<b>Form:</b>	Clear Solution
<b>History:</b>	Designed as a potential successor to DS2
REACTIVE SKIN DECONTAMINATION LOTION (RSDL)	
<b>Efficacy:</b>	Chemical warfare agents
<b>Uses:</b>	Decontamination of hands, face, and neck
<b>Chemical Action:</b>	Oxidation and nucleophilic substitution
<b>Composition:</b>	Potassium butanedione mono-oximate
<b>Form:</b>	Lotion with a yellow color
<b>History:</b>	Developed for the Canadian Defence Research Establishment

material compatibility, personnel and environmental safety. Decontamination requirements are no longer limited to personnel, equipment, buildings and the environment but also sensitive equipment such as electronic devices, computers and aircraft interiors. In addition to more sophisticated decontaminants, the Joint Program Executive Office for Chemical and Biological Defense is now working to develop inherently self-decontaminating surfaces designed to improve the Warfighter's safety margin. 

## JPEO-CBD CONFERENCES 2007

NAME	DATES	LOCATION
Navy League Sea-Air-Space	April 3-5, 2007	Washington, D.C.
JPEO Chem Bio Advanced Planning Briefing for Industry	April 4-5, 2007	Washington, D.C.
Public Service Recognition Week	May 7-13, 2007	Washington, D.C.
5th Annual Federal CBRN Detection R&D Opportunities	May 30 - June 1, 2007	Washington, D.C.
Biodefense Vaccines and Therapeutics Conference	June 4-6, 2007	Washington, D.C.
Improvised Explosive Device (IED) 2007	June 11-13, 2007	Fayetteville, NC
Joint CBRN Conference	June 25-28, 2007	Fort Leonard Wood, MO
Force Protection Equipment Demonstration (FPED) VI	August 14-16, 2007	Stafford, VA
Air Force Association Exposition	September 24-26, 2007	Washington, D.C.
Modern Day Marine	October 2-4, 2007	Quantico, VA
IP/CP/Decon Conference	October 22-24, 2007	Virginia Beach, VA
US Coast Guard Exposition	October 29 - November 2, 2007	New Orleans, LA

### SAVE THE DATE EVENTS

Event: Joint CBRN Formerly WWCC  
 Location: Fort Leonard Wood, MO  
 Dates: June 25-28, 2007  
 Theme: "Achieving DoD's Full Spectrum Capabilities"  
 Website: [www.ndia.org](http://www.ndia.org)

.....  
 This conference takes place directly on the military base where the U.S. Army Chemical School and the Chemical Defense Training Facility train America's Warfighters along with allied students on operations in a toxic chemical environment. Concerns affecting the chemical community are discussed during the conference and non-traditional threats to our military forces and domestic preparedness are presented. This is the top show in it's field where the experts meet.

Event: Force Protection Equipment Demonstration FPED VI  
 Location: Stafford, VA  
 Dates: August 14-16, 2007  
 Theme: Enhancing Military and Homeland Security  
 Website: [www.fped6.org](http://www.fped6.org)

.....  
 The focus of the demonstration will be to showcase state-of-the-art and mature commercial off-the-shelf (COTS) components and systems to DoD, Federal, state and local government and organization decision-makers, and leaders responsible for PS/FP.



# *‘The Reason for Our Success is Our People.’*



Things got hot in the headquarter's conference room Friday, February 16, when recipes from throughout the region were displayed in various crock pots during the 1st JPEO-CBD chili cook-off. Although many awards were presented, Patricio Enterprises' Ed Mosé walked away with the coveted Fire Chief Award for hottest (fire hot) dish. Um um good!

Photos by: Steve Lusher

# Chemical and Biological Defense Program Earns Coveted Unqualified Audit Opinion



**Maj. Gen. Stephen Reeves, the Joint Program Executive Officer for Chemical and Biological Defense, presents a certificate proclaiming JPEO-CBD's unqualified audit opinion to Mr. Charles Cutshall, the Director of Resource Management, JPEO-CBD.**

On November 8th, 2006, the Joint Program Executive Office for Chemical and Biological Defense (JPEO-CBD) was notified that the Chemical and Biological Defense Program (CBDP) received an unqualified or "clean" audit opinion for fiscal year (FY) 2006 – one year ahead of the Office of the Secretary of Defense (OSD) Comptroller's FY 2007 goal. As of FY 2005, only five Department of Defense (DoD) entities had received an unqualified audit opinion, representing 16 percent of total DoD assets. In FY06, the CBDP became the sixth DoD entity to achieve this government-wide goal. The JPEO, with 63% of the FY 2006 CBDP budget, holds the lion's share of the CBDP funds. The independent audit was performed by the Leonard G. Birnbaum and Company, LLP.

## Background

The Federal Managers Financial Integrity Act of 1982 required ongoing evaluations and reports of the adequacy of the systems of internal accounting and administrative control of each executive agency. Congress later mandated financial management reform by enacting the Chief Financial Officer's (CFO) Act of 1990, which was signed into law November 15, 1990. The act marked the beginning of what promised to be a new era not only in federal management and accountability, but also in efforts to gain financial control of government operations. The act established a leadership structure, provides for long-range planning, requires audited financial statements and strengthened accountability reporting.

In FY04, the Office of the Under Secretary of Defense (OUSD) (Comptroller) directed the Chemical and Biological Defense Program to develop stand-alone

financial statements subject to annual independent audit in order to obtain an unqualified audit opinion. The objective of the audit was to determine if balances and related notes presented in the CBDP financial statements fairly represent the operations of the CBDP program; and it was determined that the documents represent operations.

The audit focus areas included, but were not limited to, personnel pay practices, contracting, equipment inventories, and internal controls. The goals of the audit included:

- Improve visibility/ accuracy of payables/ expenses;
- Improve accuracy of the accounting information and provide visibility into problem areas;
- Reduce the interest penalty expense that occurs when invoice payment is delayed;
- Improve property accountability through the Military Equipment Valuation Program.

The OSD Military Equipment Valuation Program (MEVP) initiative was created in order to achieve a fully auditable DoD financial statement. The JPEO has participated for the past two years to capture the value of then-existing (as of September 30, 2005) OSD permanent property - which was defined as having a useful life of at least two years and a unit value greater than or equal to \$100,000. The Property, Plant, and Equipment (PP&E) portion of the OSD Financial Statement provides the basis for future (re)capitalization, depreciation, accounting, and reporting actions supporting the OSD financial statement/ audit process.

The JPEO staff and subordinate Joint Project Managers (JPMs) produced the initial Chemical and Biological Defense (CBD) MEVP baseline. Initially, the service life and unit cost for each program

under JPEO control as of September 30, 2005 was reported to OSD. Program level reporting waivers were requested for each entity that did not meet established reporting criteria. For programs that are MEVP reportable, detailed financial data was gathered to form each program's initial financial baseline and unit valuation. This information includes: RDT&E development costs; procurement costs; annual production data; unit fielding data; support equipment values; modernization/ modification costs; indirect costs; placed in service dates; useful life estimate; and equipment disposal dates.

The CBD MEVP baseline constituted the PP&E portion of the CBD 2005 Financial Statement. Beginning each fiscal year, the JPEO reports codes used to record program-level financial information; quarterly updated program level material fielding/ disposal information; informing OSD of any material changes affecting programs; and submitting annual update/ waiver letters for programs remaining in the RDT&E/ prototype stage of development. The OSD MEVP initiative continually updates the baseline to reflect current equipment value.

It is easy to see why the unqualified audit opinion is so coveted and difficult to achieve – particularly for the JPEO. Consider the complexity of dealing with four separate Service accounting processes, along with the multi-faceted independent audit queries, MEVP identification and review requirements, and the requirement to meet regulatory/ statutory guidance and maintain strong internal controls. Congratulations to the Team JPEO Resource Managers for meeting this challenge while also optimizing resource allocation and putting more capabilities in the hands of the Warfighter.



